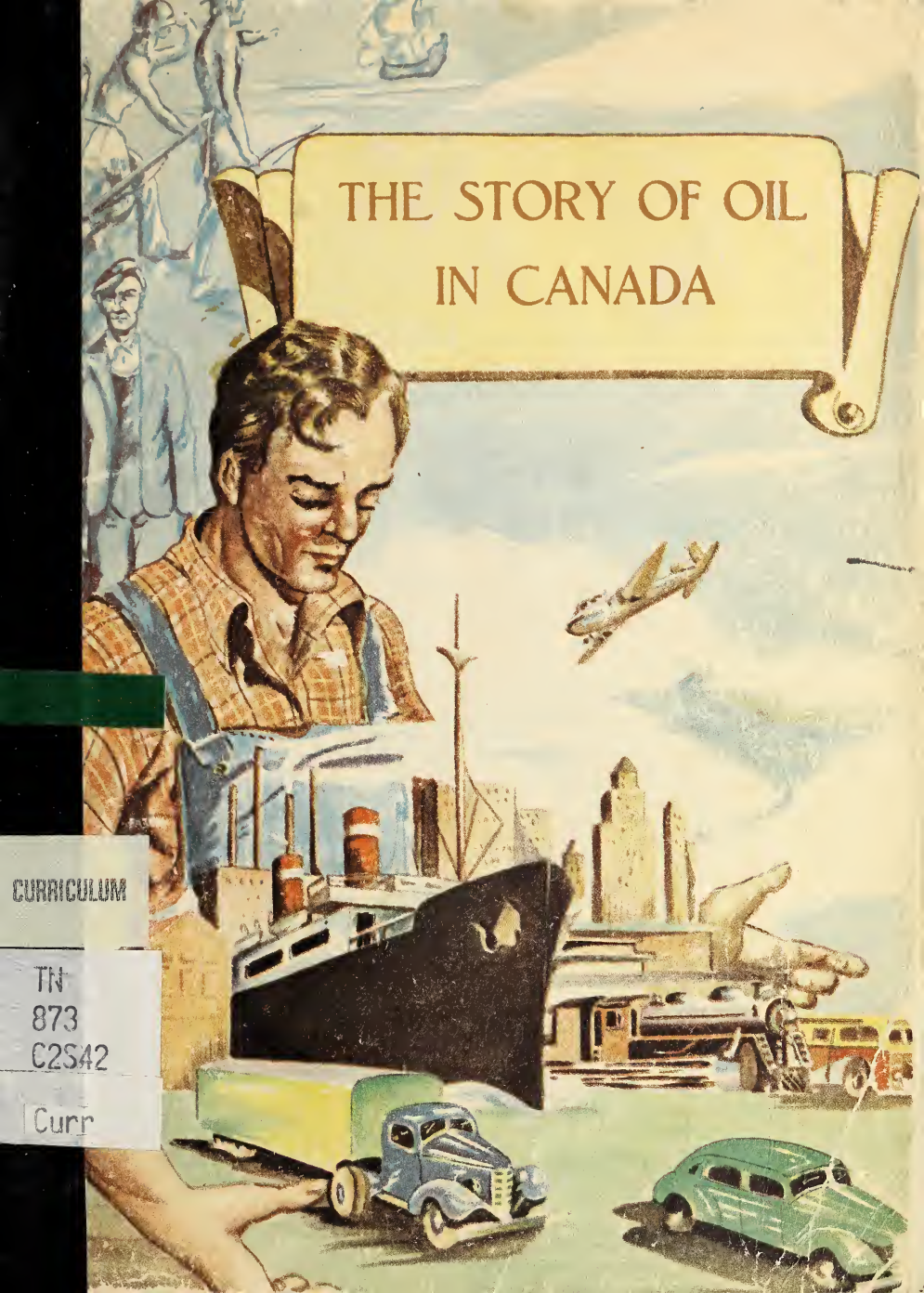
THE STORY OF OIL IN CANADA



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WINNIPE
FROM THE UNITED STATES AND SOUTH AMERICA
FROM THE UNITED STATES
OIL FIELDS
REFINERIES
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Canadian Social Studies Unit Readers

THE STORY OF OIL IN CANADA

by

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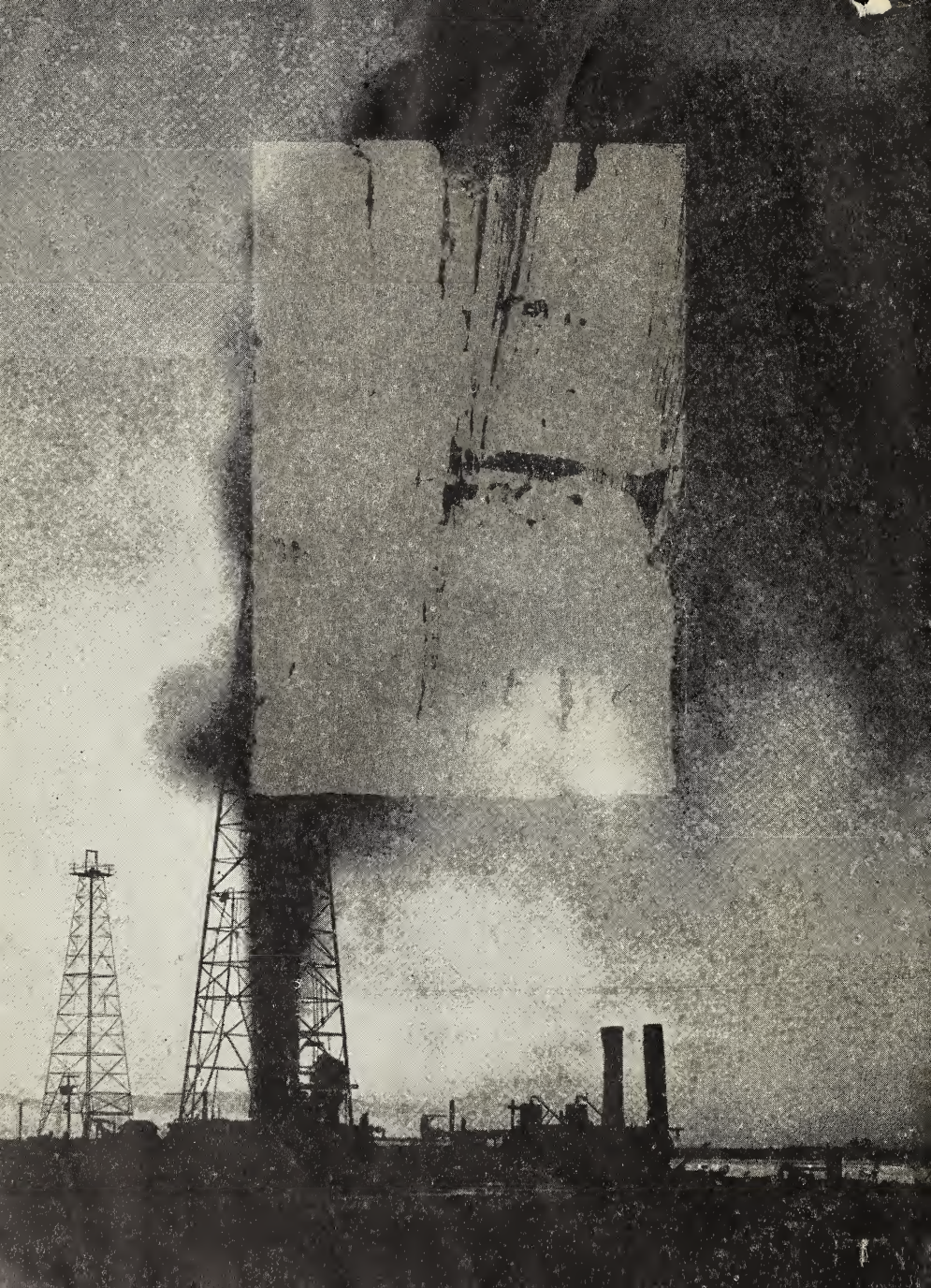

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THE STORY OF OIL IN CANADA

The Oil Age

To-day Canadians are living in the Oil Age. Everywhere in our country people find many uses for petroleum and its products. Petroleum, which means "rock oil", is stored up in the rocks far below the surface of the earth. Sometimes it is called "flowing gold", because of its great value to mankind. From it is made the gasoline which drives aeroplanes through our skies, automobiles, trucks, and buses along our highways, tractors on our farms, and motor boats on our lakes and rivers. Kerosene ("coal oil") is often used to light our homes and cook our meals. Oil is the fuel that turns the wheels of many of our locomotives and runs the engines in many of our ships. In some parts of Canada it is burned instead of coal to heat homes and buildings.

All machinery, great or small, needs a thin layer of oil or grease between the moving parts to make them run smoothly and prevent them from wearing out. We oil the engine of an automobile and grease the axle of a wagon.

Petroleum has many other uses, some of which we might not recognize at first glance. Until a few years ago all our rubber was obtained from the juice of trees which grew in hot countries. When the war cut off supplies of natural rubber from these countries, much of the rubber used in Canada was

An Oil Gusher

Courtesy Parkersburg Rig & Reel Company

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Oiling a Locomotive
Courtesy Canadian Pacific Railways

Delivering Oil for Heating
Courtesy Shell Oil Company

made from petroleum in a great plant at Sarnia, Ontario. Mineral oil and vaseline, made from petroleum, are used as medicines. Paraffin is used for making candles, waxed paper, and for sealing jars of fruits and vegetables. Asphalt is used for building fine highways and city streets, and benzine for "dry cleaning" clothing. These are only a few of the many ways in which we employ petroleum and its products.

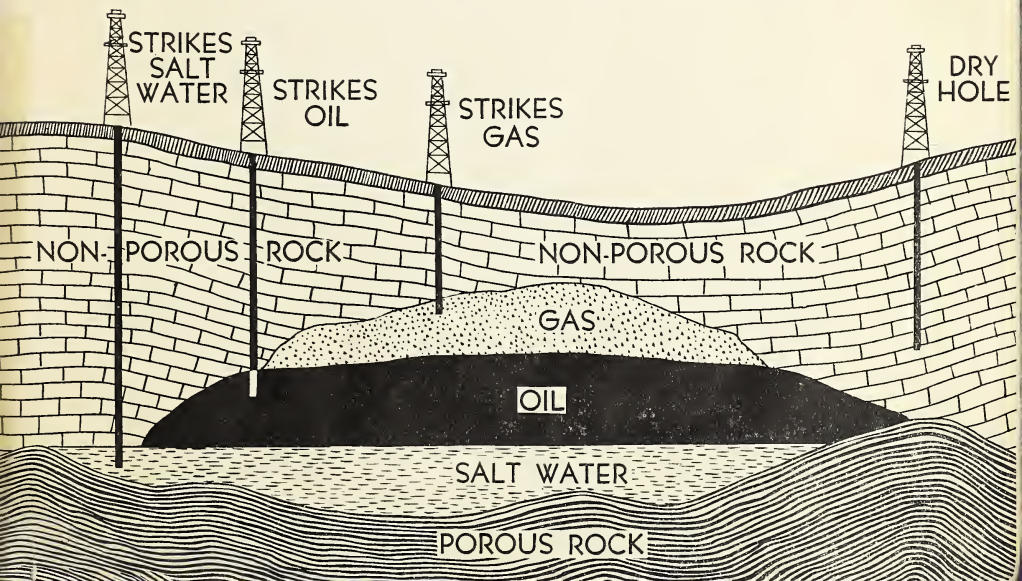
How Petroleum Was Formed

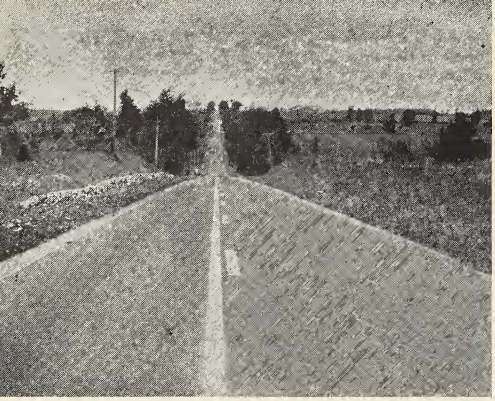
Men who make a study of rocks tell us that long before man lived on earth, seas and lakes covered many areas which are land to-day. Strange animals lived in those far-off days. Some, such as the dinosaurs whose remains have been found in Alberta, were very large, while others were so small that they could hardly be seen. Many kinds of plants that have also long since disappeared from the earth grew at that time. In almost every part of our Dominion of Canada, the remains or traces of these strange plants and animals have been found, preserved in the rocks.

When clay and sand were carried into these ancient seas and lakes, they soon settled to the bottom. Small plants and animals

died and were buried in this mud. After a long time the layers of clay and sand were changed into layers of rock by the weight of the material which settled above them. The clay was pressed together to form the rock called shale. The sand was changed into sandstone. From the bones of the animals, limestone was made. Oil was formed from the plants and animals, as the mud in which they were buried was squeezed and pressed into rock. Because there are spaces between the grains in sandstone like the holes in a sponge, the oil was able to collect in it and ooze through it. Shale, and most limestone, have very few spaces, and the oil could not pass through them. In some places, for example, Turner Valley, oil is found in porous limestone.

As the earth's crust slowly changed, great pressures bent and twisted the rock layers so that they no longer lay evenly, one above the other. A layer of sandstone might be broken off, or bent upwards, so that the oil, oozing through it, came to rock which it could not enter. Then the petroleum collected in the sandstone at this point, and formed what oil-men call a "pool". This does not mean that the oil lies in the rock like a pond of water in a field, but that it is held in the tiny spaces between the particles of the rock. Such a pool can be reached





Asphalt Highway
Courtesy Shell Oil Company

Refuelling
Courtesy Shell Oil Company

to-day by drilling a well from the surface of the earth. Very often drillers first reach a pocket of natural gas which, being lighter, has risen above the oil. Salt water, which is heavier than oil, is frequently found below it.

The First Oil Wells in Canada

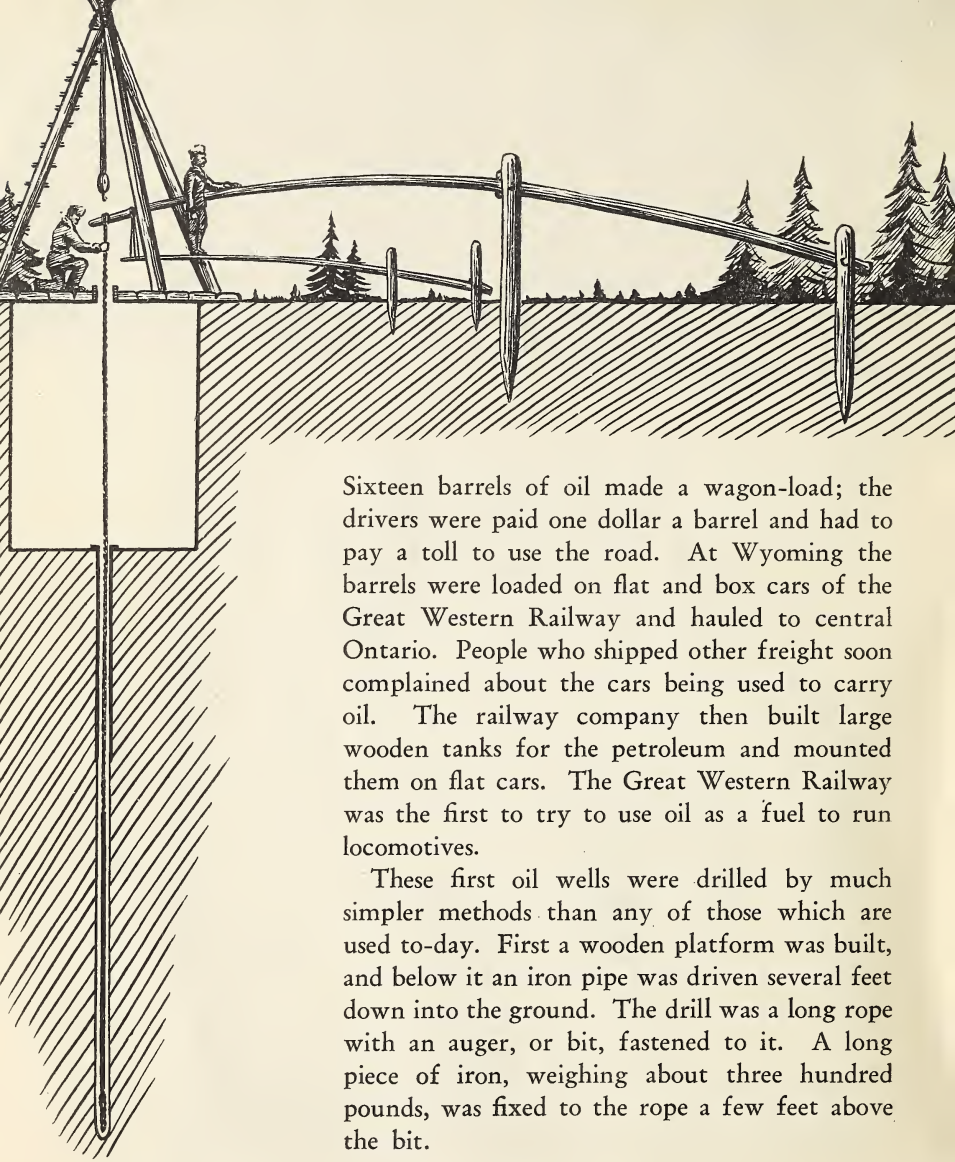
In the early days, before they learned to use petroleum, Canadians used other kinds of oil. The Eskimos burned seal oil in stone dishes to heat and light their homes. The first white settlers made candles from sheep-fat (tallow) and greased the axles of their wagons and buggies with the same useful substance. About one hundred years ago, sailors from the Maritimes built large ships and sailed thousands of miles to the South Atlantic and South Pacific Oceans hunting whales. After a whale had been killed the sailors removed its blubber, or fat. They melted the fat into oil, which they stored in barrels. Whale oil was used in lamps many years before "coal oil", or kerosene, was made from petroleum.

In 1778, Peter Pond the fur-trader, the first white man to travel down the Athabaska River, saw the Indians removing "tar" from the sands along the river bank. They covered the

seams of their canoes with this tar to keep out the water. A few years later Alexander Mackenzie, while exploring the great river which is named after him, found oil along the bank near Norman Wells, where there is a large oil-field to-day. He spoke about the "tar springs" which he saw near the river, but no use was made of his discovery. The Indians in some parts of our country often took the oil that they found floating on small pools of water and drank it as medicine. Many white settlers also used this Indian remedy.

The first well to produce oil in North America was dug at Oil Springs in Lambton County, Ontario, in 1858. A Mr. W. H. Williams found much "gum oil" (asphalt) covering some swampy land there. He dug a shallow well through the soil and gravel and discovered a little petroleum. Three years later Mr. James Shaw decided to find out whether there was any oil in the rock in the same district. When he had drilled about 160 feet below the surface of the ground he struck a pool of oil. For some time thousands of barrels of oil shot high into the air above the well every day. Such a well is called a gusher. Soon many people started drilling wells at Oil Springs and at Petrolia, a few miles to the north. The most famous gusher blew over 7,000 barrels of petroleum out of the well every day for more than two months. At that time the drillers had no way of stopping the oil from spurting out of the well. Most of the petroleum was wasted at first, for there was no place in which to store it. Millions of barrels of oil flowed over the ground into the creeks in the district and were carried away on the water.

Some of the oil was put into barrels and floated down Bear Creek to the St. Clair River. There the barrels were put on board sailing vessels. A plank road was built from Petrolia to Wyoming, the nearest railway station, about five miles away.



Sixteen barrels of oil made a wagon-load; the drivers were paid one dollar a barrel and had to pay a toll to use the road. At Wyoming the barrels were loaded on flat and box cars of the Great Western Railway and hauled to central Ontario. People who shipped other freight soon complained about the cars being used to carry oil. The railway company then built large wooden tanks for the petroleum and mounted them on flat cars. The Great Western Railway was the first to try to use oil as a fuel to run locomotives.

These first oil wells were drilled by much simpler methods than any of those which are used to-day. First a wooden platform was built, and below it an iron pipe was driven several feet down into the ground. The drill was a long rope with an auger, or bit, fastened to it. A long piece of iron, weighing about three hundred pounds, was fixed to the rope a few feet above the bit.

The drill hung in the pipe, suspended from one end of a strong sapling—a long, thick pole. The pole was fastened down firmly at the other end, and was supported at two or three points along its length by strong stakes driven into the ground. A spring-board was attached to the pole near the top end, from which hung the drill. As a man walked on the spring-board, away from the well, the end of the pole with the drill rope was lifted a few feet. When he walked toward the well, the pole and rope dropped, and the heavy weight drove the bit into the bottom of the well, cutting into the ground and loosening the earth.

Above the well three poles were fixed to form a tripod. From time to time the drill rope was attached to a hook on the tripod and pulled out of the well. A new bit was put on the rope and the hole cleaned out before drilling was started again. We can understand why it took a long time to sink an oil well a few hundred feet by this method.

Petrolia was given its name by its first postmaster because he found oil oozing out of the banks of Bear Creek. In a few years there were five thousand people living in the town. The road on the main street was covered with planks. The streets were lighted at night by coal-oil lamps. Some of the petroleum was brought to the town in wagons and stored in wooden tanks under the ground. "Lamp oil" and grease were made from the petroleum in small refineries. The material that was left over was dumped into the creeks. You must remember that this was long before the days of the automobile and the use of gasoline for fuel.

In a few years the oil stopped flowing at Petrolia and Oil Springs. Then the petroleum had to be pumped from the bottom of the wells. Now only a few hundred barrels of oil a day are produced in this district.

Oil Gusher — Turner Valley
Courtesy British American Oil Co. Ltd.

Searching for Oil

Very little of our vast country has yet been explored for petroleum. Even the geologists, the men who have made a careful study of rocks, do not know exactly where new oil pools may be hidden below the surface of the earth in Canada. But these men can tell from the formation of the earth where petroleum may possibly be discovered. Deep wells have been drilled at some of these places. Many of these wells were quite dry. Often the drillers struck salt water. Sometimes gas but no petroleum came to the surface through the hole. In only a few places in Canada has much oil been found. To dig wells is very costly, but men continue to search. They know that if they should find the "flowing gold" they will be well repaid.

More oil is still obtained near Petrolia than at any other place in Ontario. There are also wells near Tilbury, Leamington, and other points in the southwestern part of the province. A field near Moncton, New Brunswick, which supplies the people of that city with natural gas, also produces some petroleum. But to-day nearly all the oil produced in Canada comes from Alberta and from Norman Wells in the District of Mackenzie.

The Story of Turner Valley

Turner Valley, near Calgary, is the most important oil field in Canada at present (1945). About thirty years ago, a man who lived in this district saw bubbles coming to the surface of the water in a creek which ran through his ranch. They did not seem to be air bubbles. He took a match from his pocket, lit it, and touched it to the surface of the water. The bubbles burned and it seemed as if the water was on fire. The rancher knew that the bubbles were not air but natural gas. When he told people of his discovery a number of them decided to find out whether there was petroleum beneath the surface of the earth. They drilled a deep well on the bank of the creek, and at last they struck a great deal of gas and some oil. Many people in Calgary now were sure that there must be a large oil pool below Turner Valley, and that they could become rich by boring holes that would reach it. But although they drilled several more wells no one made much money, for little oil was found.

One day in October, 1924, the men working at one of the wells were feeling very blue, for although they had drilled far into the earth they had not discovered any petroleum. The company which owned the well had decided not to sink it any deeper. The men made up their minds that they would drill just a few feet farther. Suddenly gas began to pour out of the well. It lifted the pipe many feet out of the ground. Then it began to burn and the flames shot hundreds of feet into the air. It took several weeks to put out the fire.

It was found that the gas from this well contained naphtha, which is something like gasoline and can be mixed with it and

used as fuel in automobiles and trucks. Soon many more wells were drilled and the naphtha removed from the "wet" gas. Some of the gas was "washed" by passing it through chemicals which absorbed the disagreeable odour of sulphur. Then the washed gas was led through pipes to Calgary and other centres in southern Alberta, where it was used for cooking and heating. But no use could be found for most of the gas from which the naphtha had been separated. It was led away in pipes and burned in the open air. What a sight it was in Turner Valley in those days to see dozens of flames from the burning gas! At night it seemed as if the whole district were on fire.

Year after year more and more wells were drilled deeper and deeper into the earth without finding any petroleum. But at last, in June, 1936, a well over a mile deep struck oil. Within 24

Burning Gas — Turner Valley
Courtesy Imperial Oil Limited

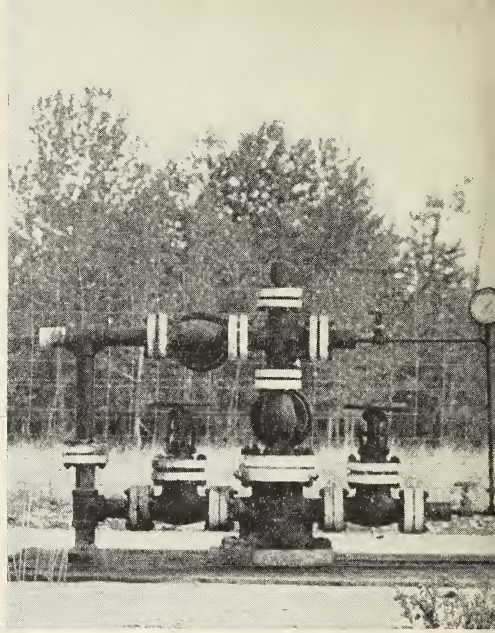
hours this well produced more than seven hundred barrels of petroleum. Now Turner Valley really became an oil field. Since that time over 300 deep wells have been drilled there, and nearly all of them have struck oil. For a time almost thirty thousand barrels of petroleum poured out of these wells every day. Turner Valley is still Canada's greatest oil field, but less and less flowing gold is being obtained there each day. In a few years the wells will "go dry", and the men and their families will leave their homes in the Valley and look for work elsewhere.

Centring Drill Bit Over Hole
Courtesy National Film Board

Oil has also been found in southern Alberta near Taber, Conrad, and Princess, and east of Edmonton at Vermilion and Lloydminster, as well as at some other places in the province. But only a few wells have been drilled in these fields, and they are not producing nearly as much petroleum as those in Turner Valley. They may do so in time to come, but it is impossible to predict the future of any oil field.

Let us pay a visit to Turner Valley to watch the drillers at work. Everywhere we see derricks—tall steel towers which have been built on concrete foundations where wells are being drilled. There are five men in the crew at each well—the driller and his four helpers, who are called "roughnecks". We watch one crew working at a well where they are about to start drilling. Two of the men are up on the derrick and have

Attaching Length of Pipe
Courtesy Imperial Oil Limited



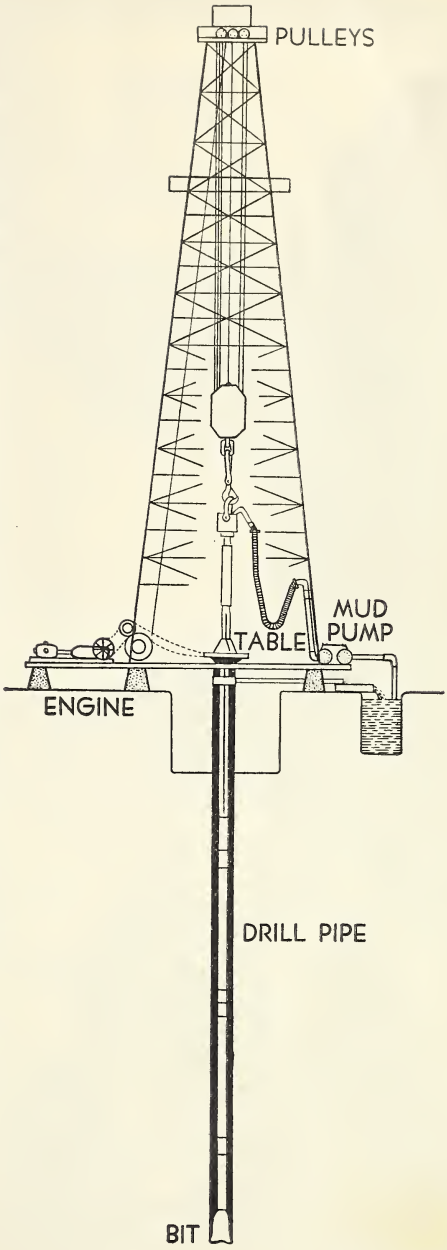
"Christmas Tree"
Courtesy Imperial Oil Limited

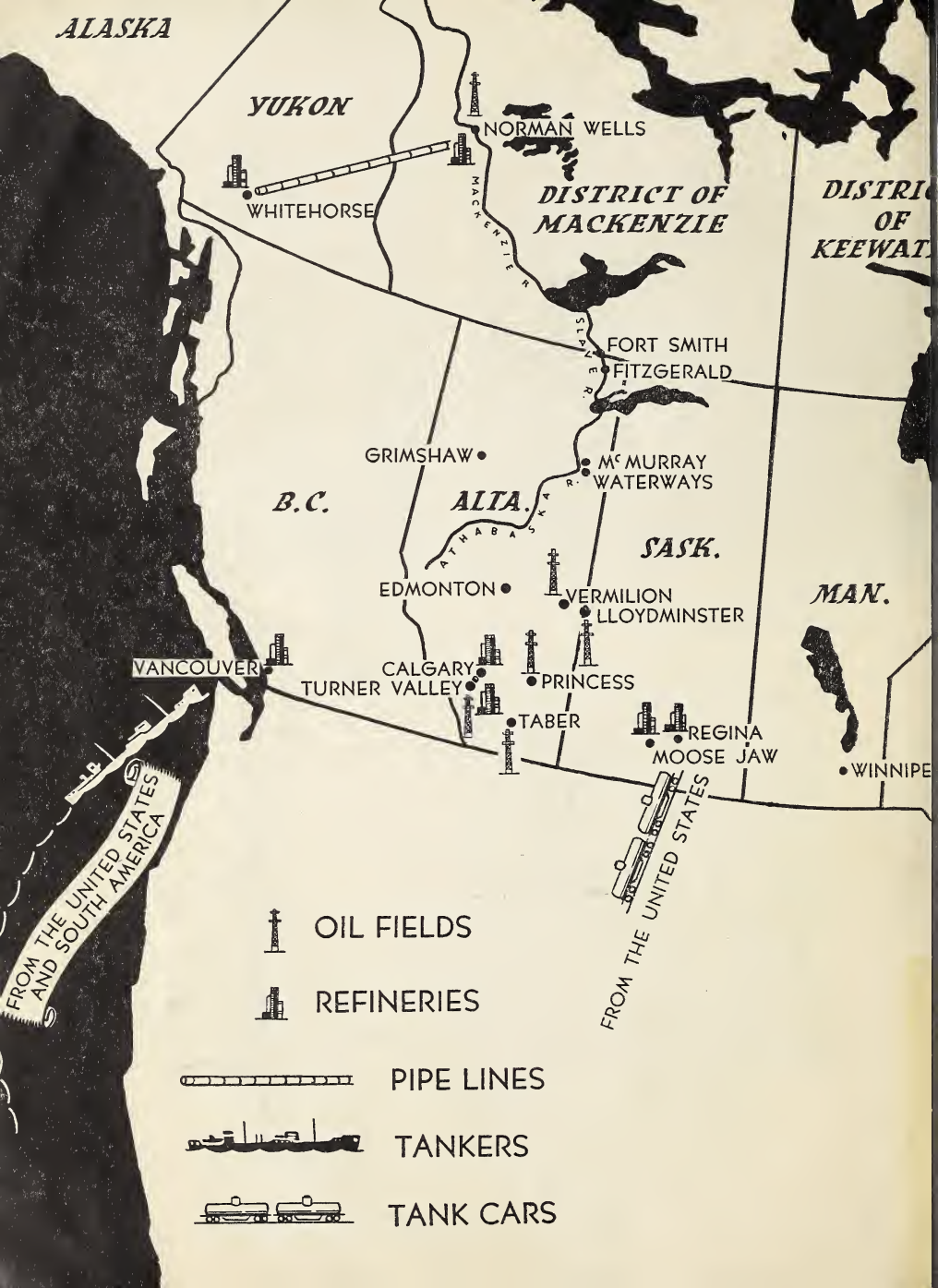
fastened some long hollow steel pipes to a set of pulleys at the top of the derrick. A third member of the crew is attaching a steel bit to the bottom of the lowest pipe. The end of this pipe is then passed through a hole in a table that has been built on the foundation. Nearby is a steam engine which runs on natural gas. Everything is ready for drilling to begin.

The driller gives a signal, the engine is started, and the table begins to turn. The table turns the pipe and the bit drills a hole in the rock just as a brace and bit drills a hole in a piece of wood. After a time the bit will have gone down so far into the earth that the crew will have to climb up on the derrick and fasten new lengths of pipe to the drill. The drill pipe will be about 7,000 feet long when it reaches the rock containing the oil.

Beside another well we notice a deep hole, full of gray mud. From it pumps are forcing the mud through a hose which leads into the drill pipe. When the mud reaches the bottom of the hole it is forced out under pressure through small holes in the bit, and up through the space between the drill-pipe and the sides of the hole. The mud carries up with it the pieces of rock which have been cut by the bit and brings them to the top of the well. In this way the hole is cleaned. The pieces of rock are allowed to settle out of the mud, which is then used over again.

At a third well, drilling has stopped. For over two hours the men have been raising the pipe out of the well, unscrewing the pieces and putting them in a big pile beside the derrick. Now they have reached the last piece of pipe. The driller removes the old bit, which has become dull and worn, and replaces it with a new one. Then the crew takes the pipes from the pile, and fastens them together as they are lowered into the well again.

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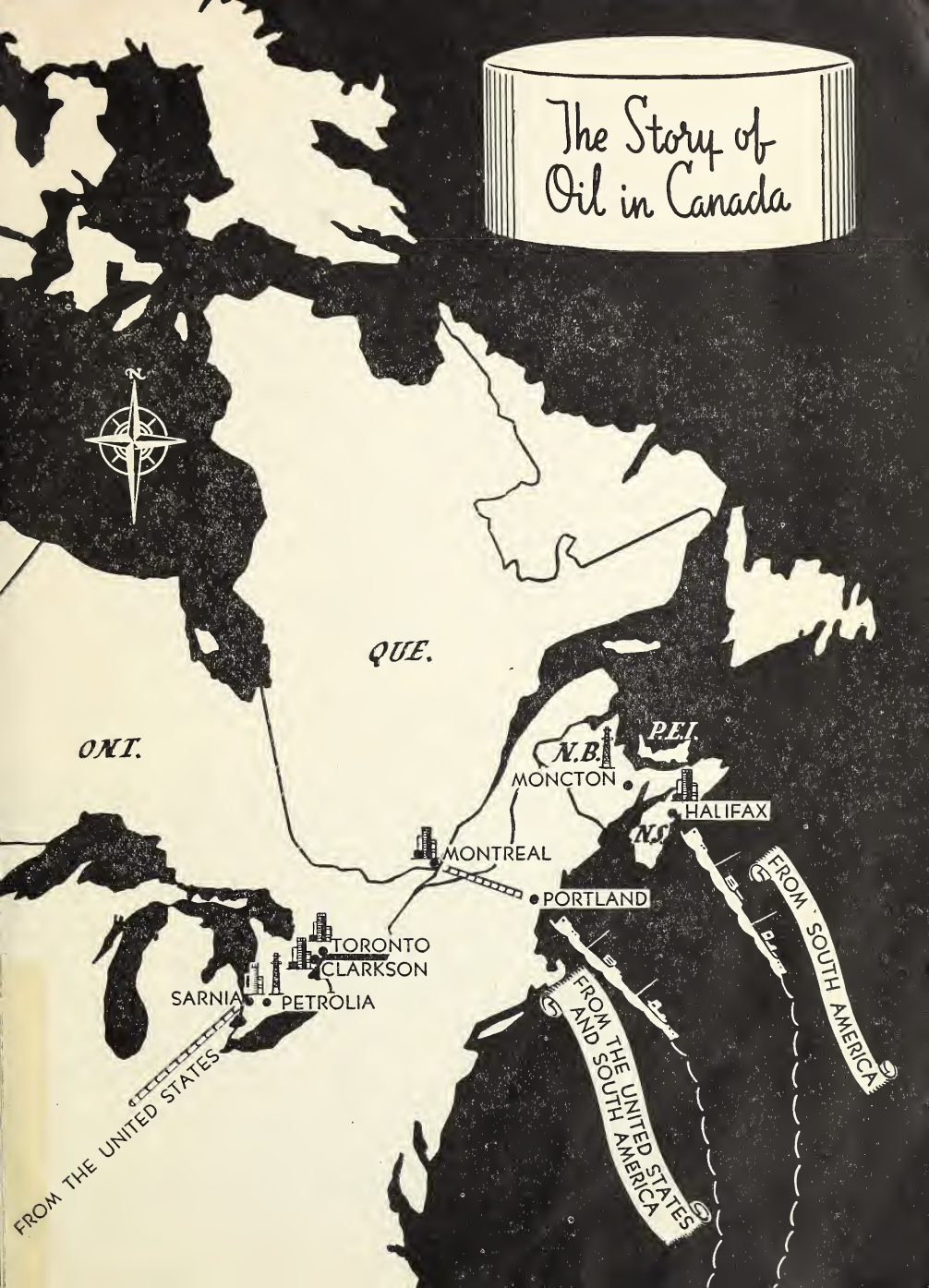
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FROM THE UNITED STATES AND SOUTH AMERICA
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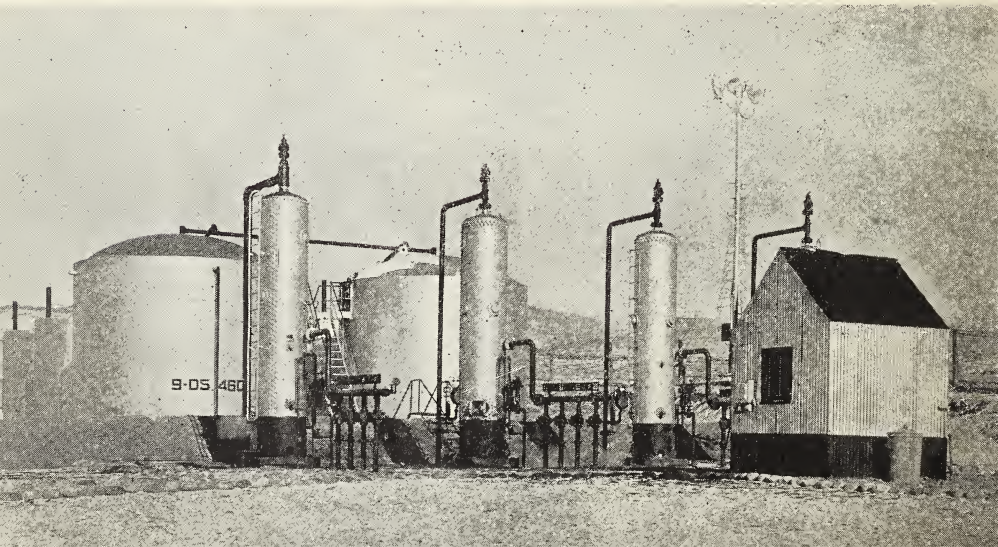
At another well all the tools have been taken out of the hole. The well has reached the rock containing the oil. The crew must make sure that the walls of the hole do not cave in and that no water gets into the hole. They have put steel pipe, called casing, into the hole, and have cemented it in place. Now they are ready to lower the tools inside the casing and start drilling again.

We reach another well just as it is "brought in", that is, just as it begins to produce oil. In former days, it might have "blown in", with mud, gas, and oil blown high into the air. Nowadays this seldom happens. The drillers have valves and pipe connections ready to attach to the casing and tubing in the well, to control the pressure of gas and oil. This arrangement of valves and pipe connections is called a "Christmas tree"—perhaps because there are wheels sticking out all around it, like decorations on a tree.

From the producing well, the oil and gas will be run through a pipe into tall metal tanks where the oil will be separated from the gas.

Oil storage tanks. Three cylinders in foreground separate natural gas from crude oil. Turner Valley

Courtesy Imperial Oil Limited



The Story of Norman Wells

Along the east bank of the Mackenzie River, about seventy-five miles south of the Arctic Circle, lies Norman Wells. The oil field here may soon become as famous as Turner Valley. Although wells were drilled at Norman Wells twenty-five years ago, it has only been during the past two years that large quantities of petroleum have been produced.

Early in the summer of 1920 some scows loaded with drilling machinery were pulled by motor boats to what is now known as Norman Wells. The men who brought them worked for a Canadian oil company. Their long hard journey had started at Peace River in Alberta, over 1200 miles away. After the men had unloaded the cargo, they used oxen to haul the materials to a place at which it had been decided to drill a well. Long before they reached this spot the poor animals got stuck in the soft ground and could go no farther. The men had to sink the well at this point. It was lucky for them that they did so. If they had drilled at the place which had first been chosen they would have found no oil.

Later in the summer the drillers struck oil. The well was almost eight hundred feet deep. A few more wells were drilled successfully. A small refinery was built. However, there were few people in our Canadian northland at that time, and they had little use for oil. Both the wells and the refinery were soon closed. Later, men discovered radium and silver along the shores of Great Bear Lake, and gold at Yellowknife on Great Slave Lake. Soon they needed fuel oil for the mines and vessels and gasoline for motor boats and aeroplanes. Again wells were drilled and petroleum refined at the northern oil field.

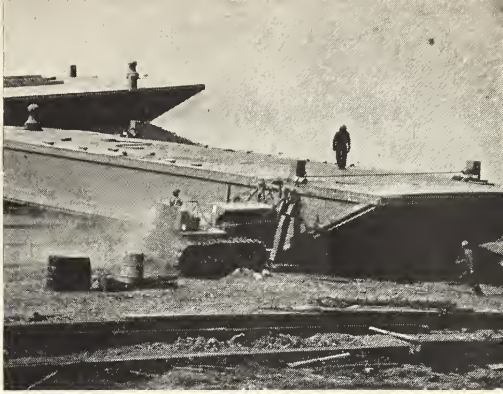
Alaskan Highway
Courtesy National Film Board

Soon after the United States went to war with Japan the Japanese occupied some of the Aleutian Islands off the coast of Alaska. The Americans knew that their armies would need a great deal of oil and gasoline in their fight to defend Alaska and to drive the enemy back to Japan. As Norman Wells was the only oil field near Alaska, the United States and Canada decided that a great many wells should be drilled there. A road and pipe-line were to be built from Norman Wells to Whitehorse, and a large refinery built at Whitehorse to make gasoline and other petroleum products. This was called the Canol Project, Canol being short for Canadian Oil.

The biggest job in the Canol Project was to get to Norman Wells the men, machinery, pipes and other supplies for drilling the wells and building the pipe-line. A great many Canadians, as well as thousands of American soldiers and men and women who were not in the army, took part in this work. Materials were sent by railway three hundred miles north from Edmonton to Waterways. When the goods were unloaded from the freight cars they had to be shipped the rest of the way by rivers and lakes to Norman Wells. This trip by water was about as long as that from Montreal to Fort William.

The water is very shallow in some places on these northern rivers. Large vessels like those on the Great Lakes cannot be

Towing a Barge over Portage
Courtesy National Film Board



Launching Barge at End of Portage
Courtesy National Film Board

used. The freight is placed on flat-bottomed boats, which are pushed slowly ahead by wood-burning steam boats or oil-burning tug-boats. Goods can be shipped by water for only a few months each year, because Great Slave Lake freezes over in October, and the ice does not break up in this lake until about the middle of June. There are sixteen miles of rapids on the Slave River between Fort Fitzgerald and Fort Smith. All freight had to be unloaded from the boats at Fort Fitzgerald and hauled by trucks on a road along the river bank. The barges (freight boats) and even some of the tug boats were lifted out of the water, loaded on trailers, and pulled across the portage by tractors.

Everyone worked hard all the summer of 1942 loading and unloading supplies, building boats, cabins, and roads, cutting firewood, and doing many other jobs. Yet, when the lakes and rivers froze over in the fall, much remained to be done. Supplies were scattered at many places along the water route from Fort Smith to Norman Wells because there were not enough boats to get them north before the freeze-up.

Many of the troops from the United States were negroes who had lived all their lives in the southern part of that country. Even though they had to fight mosquitoes and bull-dog flies

Tent City During Canol Project
Courtesy Imperial Oil Limited

Typical Shelter During Canol Project
Courtesy Imperial Oil Limited

all day long, they sang as they worked. Some of the men had brought musical instruments along with them, and played for the people in the camps in the evening. On one occasion, a vessel carrying a number of the coloured soldiers to Norman Wells had to stop close to the shore because a bad storm came up as it was crossing Great Slave Lake. The men went ashore to carry out their drill exercises. An Indian who was hiding in the bush had never seen such strange men before. He thought they were performing a war dance. He made his way quickly back to where the chief and the rest of the tribe were camped. Soon all of the Indians were watching the soldiers performing their "dance".

When the negroes reached Norman Wells they built Camp Canol across the Mackenzie River from the oil field. They were sure that they would "freeze to death" in the winter. Although it turned out to be the coldest winter that had ever been known in the north, the coloured soldiers had such warm clothing that few of them were even badly frostbitten.

A great deal of freight had to be brought to Camp Canol during the winter so that the project could be finished as soon as possible. It was shipped by railway to Grimshaw in the Peace River district in Alberta. There the freight was loaded

on "cat" trains and trucks. Each train was made up of a number of large sleighs fastened together and pulled by a caterpillar tractor. The crew ate and slept in a "caboose" at the end of the train. These trains fought their way slowly to the west end of Great Slave Lake and then travelled near the east bank of the Mackenzie River to Norman Wells and across the ice to Camp Canol. On most of this long cold journey there was neither road nor trail to follow.

Another important job was also finished during the first winter—the choosing of the route along which to lay the pipe which would carry the oil from Norman Wells to Whitehorse. There was much swampy land in the district, so the best time to travel through it was winter when the ground was frozen. Seven groups of white men and Indian guides started out from Camp Canol to find a way through the Mackenzie Mountains. Some used horses, others tractors pulling sleighs. Still others used dog teams. The only people to finish the trip were a white man who had lived many years in the Canadian North and his Indian friends with their dog teams.

The pipe could be laid on the ground and did not have to be protected in any way from frost, for the oil from Norman Wells would flow in even the coldest winter weather. The line was to run under the Mackenzie River, through much swampy land, through several passes in the mountains, and across some

The Canol Pipe-Line
Courtesy National Film Board

Refinery at Norman Wells *Courtesy Imperial Oil Limited*

lakes in Yukon Territory. Of course, the oil would not flow uphill, so pumping stations had to be built at many places along the line to force the petroleum through the pipe.

Before the line could be laid, a road had to be built so that trucks could haul the pipe to the places where the crews were working. The building of the road took much more time than the laying of the pipe-line. The men worked from both ends of the route. The pipe and other supplies for the western part of the line were brought to Whitehorse from Skagway, Alaska, by the White Pass and Yukon Railroad. Many of the men working near Norman Wells were carried by aeroplane north from Edmonton to their jobs in about seven hours. It would have taken them some weeks to have made the trip by railway and river vessel. The Canol road was not finished until December 31, 1943. A little later, on February 16, 1944, the

crews working from east and west on the building of the pipe-line met in a pass in the Mackenzie Mountains, and the last lengths of pipe were joined together.

Drilling went on day after day at Norman Wells. By the time that the pipe-line was finished, the wells were ready to pour several thousand barrels of petroleum into the pipes every day. A little later the refinery which had been built at Whitehorse was ready for use. A great celebration was held in that town on April 30, 1944, when the refinery was opened. For about a year it made gasoline for the aeroplanes in Alaska and Yukon Territory, and for the trucks and cars on the Alaska Highway. It also made fuel oil for the tractors and other machines in this great region. Much of the gasoline was sent from the refinery to the airports through hundreds of miles of pipes. The refinery at Whitehorse is now closed, but the one at Norman Wells is still running. Now that the war is over, Norman Wells will supply fuel for machines that will carry men through the air, on the land, and on the water in our Canadian northland.

The Athabaska Bituminous Sands

If you were to walk along the banks of Clearwater River near Waterways, or along the banks of the Athabaska River near McMurray, you would notice that the sand was held together by a black substance that looks very much like tar. This material, which is called bitumen, was probably formed in the same way as oil, long, long ago. The Indians found some uses for bitumen in the early days. When the mosquitoes were bothering them as they sat about their campfires, they would throw some of the sand on the fire. The smoke from the burn-

ing "tar" soon drove the insects away. The red men also found that if they covered the seams in their canoes with the bitumen, it would help to keep out the water.

Since the building of the railway from Edmonton to Waterways, white people have also made use of this valuable substance. They found that when the bitumen had been separated from the sand it could be applied to roads to bind the other materials together and form a smooth hard surface. Most wonderful of all was the discovery that bitumen could be refined to produce gasoline, fuel oil, and other valuable materials.

Bituminous sand is now being mined with steam drills near McMurray. After the bitumen has been separated from the sand by treating the material with warm water, it is sent to a refinery where gasoline and fuel oil are obtained from it. At present it costs more to obtain gasoline from bituminous sand than from petroleum. When we can no longer obtain any more oil from the rocks we may have to depend upon the bituminous sands to supply us with gasoline. There is so much of this material in the Athabaska district that it is said that more gasoline could be made from it than from all the petroleum that is now known to be in the oil fields of the whole world.

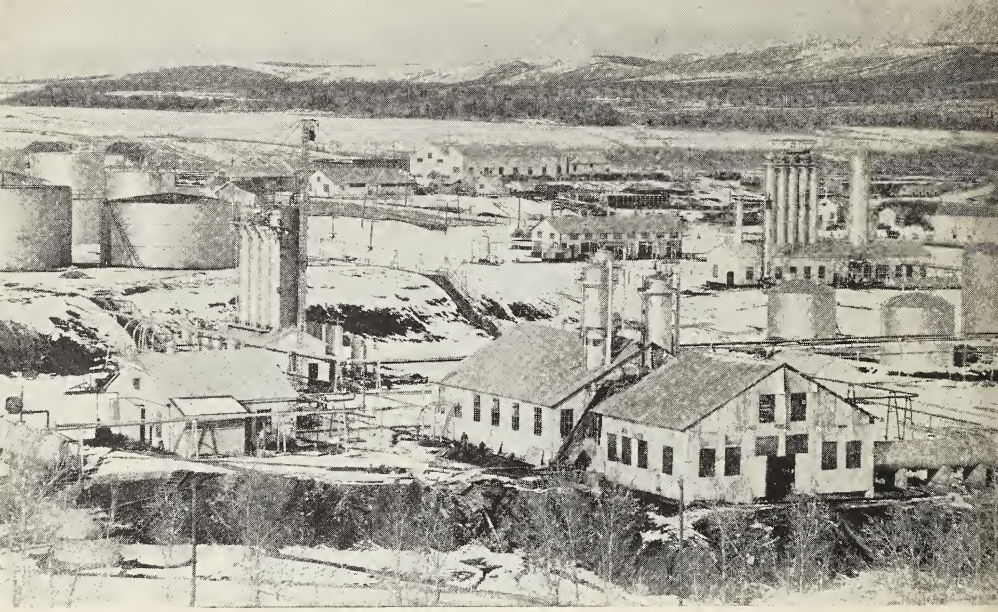
Bituminous Sands
Courtesy Department of Mines

Natural Gas and Its Uses

You will remember that when men drilled wells in Turner Valley they struck natural gas as well as oil. This useful fuel has always been present wherever petroleum has been found in Canada. It has also been discovered by itself at other places in our country. The people who live in Edmonton, Calgary, Medicine Hat, Lethbridge and many other communities in central and southern Alberta are very lucky. They do not have to depend upon coal or wood to heat their homes and cook their meals. Instead, they use the natural gas which has been brought in pipes from the fields at Turner Valley, Medicine Hat, Viking, and Kinsella. This fuel is clean, convenient, and cheap.

For many years the people of Medicine Hat used natural gas to light the streets of their city. The lights burned all the time. The gas was so cheap that it would have cost more to hire men to light the lamps each evening than it did to leave them burning all day long. Gas is also used in Alberta as fuel in greenhouses, bakeries, meat-packing and brick-making plants, and in factories which make glass, pottery and many other products. We do not see dirty smoke pouring from the chimneys of these plants, as we probably should if coal were used as fuel. In Calgary, one of the largest chemical factories in Canada uses great quantities of natural gas for making materials for explosives and fertilizers.

Long ago people struck gas when drilling for oil at Pelican Rapids on the Athabaska River. The gas caught fire and burned for several years before the fire was put out. At some places along the banks of rivers in northern Alberta gas makes its way to the surface, and trappers often use it to cook their meals.



Refinery and Natural Gas Plant. Turner Valley
Courtesy Imperial Oil Limited

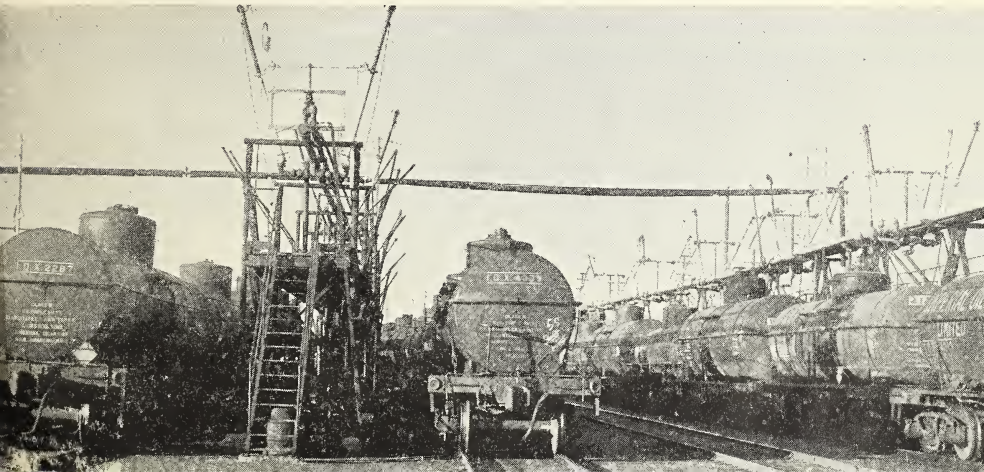
Although most of the natural gas used in Canada is produced in Alberta, it is also found in some of the other provinces. In Saskatchewan there are gas wells near Lloydminster and Kamsack. In New Brunswick, the people of Moncton use this fuel in their homes. It is piped in from the field at Stony Creek, a few miles away. When gas was found near Port Colborne, Ontario, in 1885, it was piped to the city of Buffalo, in the state of New York. A few years later this fuel was sent from wells near Leamington in Essex County across the border to Detroit and Toledo. So much gas was sent to the three cities in the United States that at last there was little left in the Ontario fields. The most important fields in that province to-day are at Tilbury, Chatham, and Haldimand near Lake Erie, and at Oil Springs and Dawn near the St. Clair River.

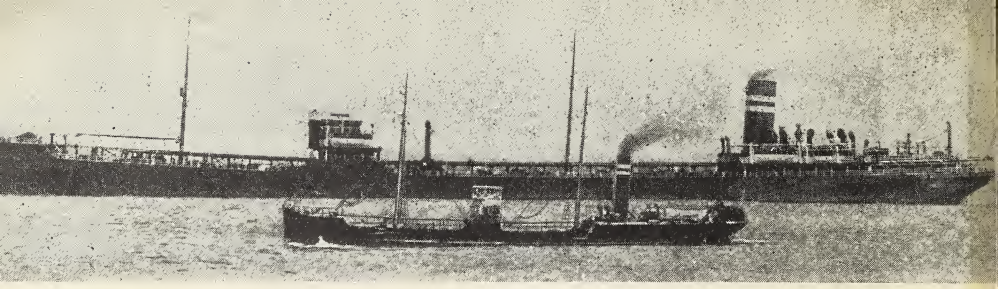
Natural gas is used in some of the homes and factories in Windsor, London, Chatham, Hamilton, Sarnia, St. Catharines, Brantford, and other cities. However, the natural gas piped to these cities is not enough to supply nearly all the fuel which is needed. Some times the natural gas is mixed with gas made from coal.

Transporting Oil to Refineries

Except for the people of the United States, Canadians use more oil than any people in the world. That is, if you divide the total amount of oil used in a country by the number of its people, each Canadian uses more oil than anyone but an American. But only fifteen per cent of the oil Canadians use comes from Canadian wells. The balance we import mainly from the United States and South America. At present the United States is by far the world's greatest oil producer, Russia is second, and South America (chiefly Venezuela) third. Iran, the Dutch East Indies, Rumania, Mexico, and Iraq, follow in that order. In 1938 Canada produced only one barrel for every two hundred and fifty barrels produced in other parts of the world.

Tank Cars at Loading Rack *Courtesy Imperial Oil Limited*





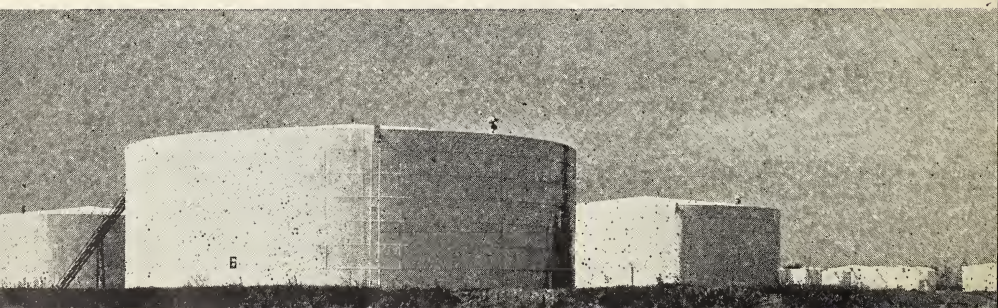
Oil Tankers *Courtesy Imperial Oil Limited*

Very little petroleum is refined at the oil fields. Most of it must be taken to refineries which have been built in places where large amounts of gasoline and other products are used. We have already read that petroleum was sent from the oil field at Norman Wells to the refinery at Whitehorse through a long steel pipe laid on the ground. A pipe-line a few feet below the surface of the soil carries the oil from Turner Valley to the big refineries in Calgary. Some of the petroleum from Turner Valley is put into large steel tanks on railway cars at Calgary and shipped to Regina to be refined.

The oil used in the refineries in the rest of Canada has to be brought from fields in the United States, Venezuela, Colombia, Ecuador, and Peru. The petroleum for the huge refinery at Sarnia is piped from the United States. Some oil is sent from that country in railway tank cars to plants in the Prairie Provinces.

All the petroleum brought to Canada from the countries of South America, and much of that from the United States, is carried in ocean vessels. Large ships called tankers have been built for this work. The inside of the vessel is divided into

Storage Tanks at Refinery *Courtesy British American Oil Co. Ltd.*



large steel tanks. The oil is pumped into and out of the tanks through long pipes running along the sides of the ships. Tankers bring petroleum from California and South America to the refineries at Vancouver. They also carry oil from ports in South America and Texas to refining plants at Halifax. Many brave Canadian sailors lost their lives during the war, when their tankers were sunk by German submarines. A pipe-line over two hundred miles long has been built from Portland, Maine, to Montreal. Tankers which used to carry oil from Texas and South America to the refineries in Canada's largest city may now unload their cargo at Portland. This saves the vessels a voyage of about two thousand miles. Petroleum is also brought in tankers from Montreal to refineries at Toronto, and from American ports on Lake Erie to some refineries in Ontario.

Welding the Portland-Montreal Pipe-Line. The river is the St. Lawrence
Courtesy Toronto Daily Star

Refining the Oil

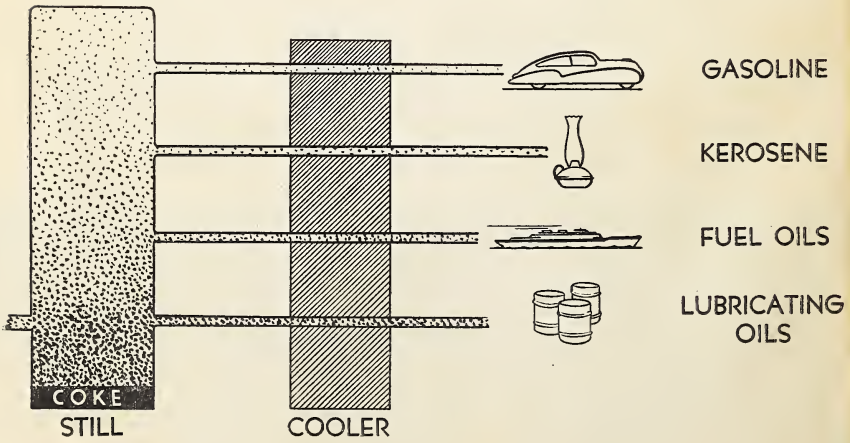
At the refinery the petroleum is separated into the many different materials that are in it. How is this done?

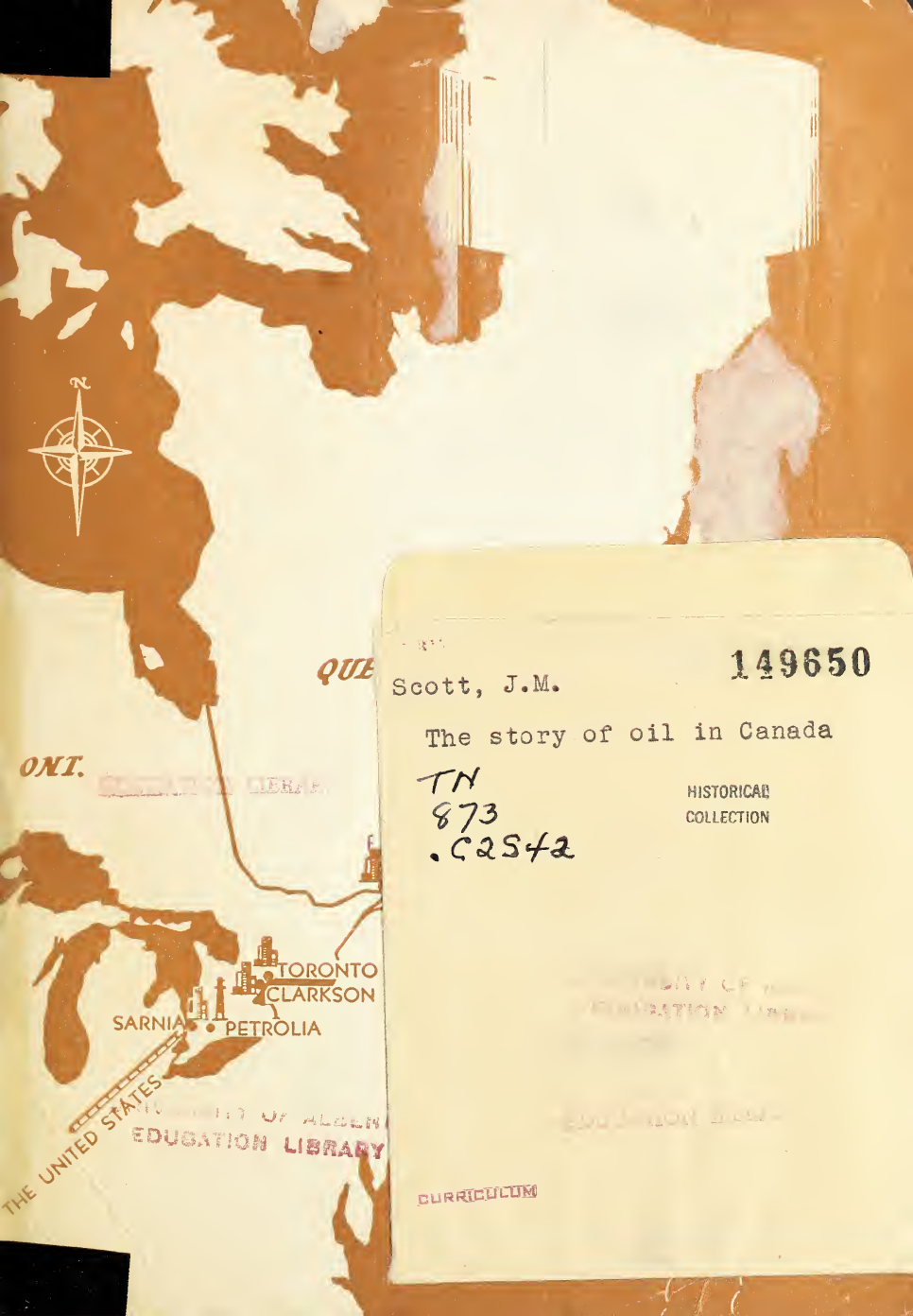
When we heat water it is changed into the vapour called steam; when we cool the steam, it changes back into a liquid again. When petroleum is heated, not one but several substances pass off as vapour. These vapours, like the steam,

become liquids when they are cooled. In a very simple type of refinery, crude oil is heated in a steel tower called a still. The vapours are led off from the still through pipes which are surrounded by cold water. Some natural gas is driven off when the oil is first heated. As the petroleum becomes hotter, first gasoline, then kerosene, and then fuel and lubricating oils are set free as vapours. If the temperature of the oil is raised still higher, asphalt or wax or coke will remain in the still when it has cooled down.

The methods used at a large modern refinery are much more complicated. These methods may also vary a good deal from one refinery to another, depending on the quality of the petroleum and the products wanted.

If we were to visit one of the largest refineries, we should see many big tank trucks being filled with gasoline. These trucks will deliver the fuel directly to the underground tanks at the automobile service stations. Many of the products are loaded at the refinery into tank cars and shipped to centres where they are stored in large tanks along the railway track. Sometimes gasoline and other products are shipped from the refinery in boats. Thus by day and by night thousands of people in our country are at work helping to write the story of oil in Canada.





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